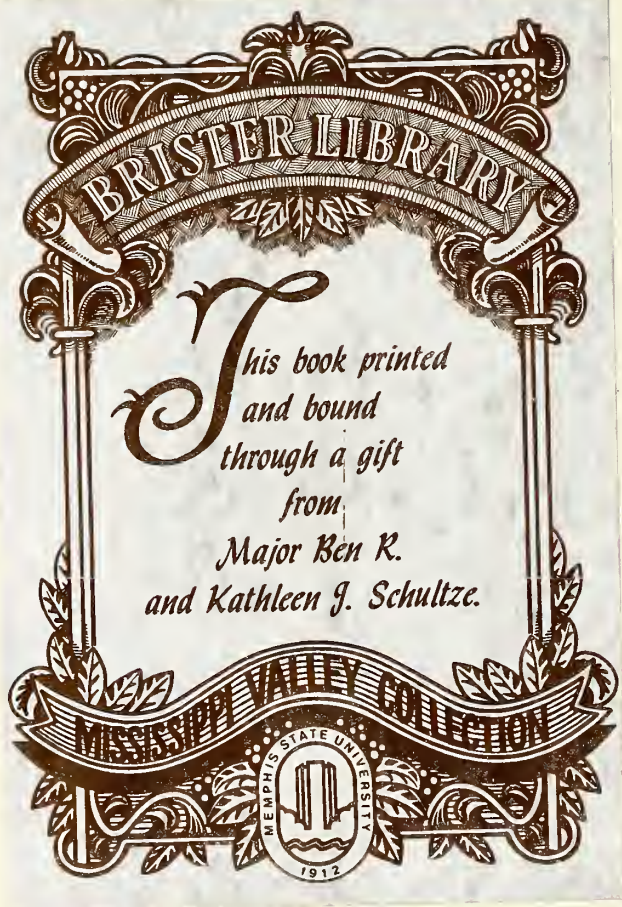


ORAL HISTORY OF THE TENNESSEE VALLEY AUTHORITY  
INTERVIEWS WITH  
DONALD H. MATTERN

BY - CHARLES W. CRAWFORD  
TRANSCRIBER - SHARON C. HESSE  
ORAL HISTORY RESEARCH OFFICE  
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INTERVIEWS WITH DONALD H. MATTERN

MARCH 17, 1972

BY CHARLES W. CRAWFORD

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ORAL HISTORY RESEARCH OFFICE

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PLACE Knoxville, Tenn.

DATE 3-17-1972

Don H. Mattern  
(Interviewee)

Charles W. Taylor  
(For the Mississippi Valley Archives  
of the John Willard Brister Library  
of Memphis State University)



THIS IS THE ORAL HISTORY RESEARCH OFFICE OF MEMPHIS STATE UNIVERSITY. THIS PROJECT IS "AN ORAL HISTORY OF THE TENNESSEE VALLEY AUTHORITY." THE PLACE IS KNOXVILLE, TENNESSEE. THE DATE IS MARCH 17, 1972, AND THE INTERVIEW IS WITH MR. DONALD H. MATTERN. THE INTERVIEW IS BY DR. CHARLES W. CRAWFORD, DIRECTOR OF THE MEMPHIS STATE UNIVERSITY ORAL HISTORY RESEARCH OFFICE, AND WAS TRANSCRIBED BY MRS. SHARON C. HESSE.

CRAWFORD: Mr. Mattern, I suggest we start with some basic biographical information. We might start with the idea of covering your life in some detail up to the point at which you became associated with TVA.

MATTERN: I was born in Johnstown, Pennsylvania July 19, 1905. I lived there during my early childhood and then moved to Tyrone, Pennsylvania where I graduated from high school. I then went on to Penn State College--now University--where I graduated in civil engineering in 1926. I got a graduate assistantship at Iowa State College from which I got a Masters in hydraulic power in June of 1928. It was there that I met my wife, May Foster, who had come up from Texas for her Masters in home economics.

My first job out of Iowa State was with Consumers Power Company in Jackson, Michigan where I was with the production and transmission department, the work being in the operation and



maintenance of the twenty hydro projects which the Consumers Power Company owned. I was caught by the Depression, and left there at the end of December 1931 and was out of work for about eighteen months. During this time I wrote a thesis from which I got my professional degree in civil engineering from Iowa State in 1932. In July of '33 I was employed by a consulting engineer in Keyser, West Virginia on utility rate investigations at Columbus and Cincinnati, Ohio. I worked for him until January, 1934 when I was employed by the Tennessee Valley Authority as assistant to the Chief Design Engineer. I worked in that capacity doing odd jobs in the design organization until the fall of 1938, when I was transferred to the Division of Water Control Planning in the Project Planning Branch. I worked there--well, I should go back just a little bit. From 1936 to '38 I worked for the Chief Mechanical Engineer on hydro plant testing. We, i.e., TVA, ran the first acceptance test on a hydro turbine by testing the model of the turbine. This was the first time such had ever been done. The test was run on the Wheeler fixed-blade hydro unit. The reason the test was run on the model instead of the field installation was because of the size of the Wheeler unit--264 inches in diameter--which was the largest built at that time, and because the intake conditions were such that the then accepted field test methods were not applicable.

To continue, in the fall of '38 I transferred to the Division of Water Control Planning in the Project Planning





Branch. I worked there until my retirement August 1, 1970. I was chief of that branch from 1954 on. That, fairly briefly, is the experience which I have had.

CRAWFORD: Fine. May I go back and start with some questions on some parts of this, Mr. Mattern?

MATTERN: Sure.

CRAWFORD: I wondered when you were working in West Virginia how you made contact with TVA? What did you know of TVA by this time, and what did you think of it? How did you happen to leave there to go to work in the Valley?

MATTERN: I saw an engineering press release that TVA was being formed, and since it was water resource development largely and that was my particular interest, I made application as soon as I knew that the organization was going to come into existence. And I suspect, although I never learned definitely, that Mr. Riegel, who came originally from Lancaster, Pennsylvania, saw my application and, knowing that I was from Penn State and had graduated with a fairly high standing and because of the Master's degree at Iowa State and the work in Michigan, was the reason he picked me. But I never learned his true reasons.

CRAWFORD: Your credentials must have been impressive at least

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in some way because I know at this time the country was flooded with engineers who were looking for things to do.

MATTERN: Well, that's right. And, of course, some of the early work was in investigations. I had indicated that my chief interest was in general work; not in detailed design work. And that, of course, was what was necessary because the early work at TVA was to develop the best way to provide (this was according to law, of course) nine-foot navigation from the mouth of the river to Knoxville. That involved reviewing the Corps of Engineers plan that was developed in house document 328. Then, of course, we were to look at all of the different possibilities to provide a multiple purpose development from the mouth of the river to Knoxville.

One of the first things that we worked on was any alternatives to the Pickwick Landing project. The Corps of Engineers had a number of sites, and one of the first things we did was to make preliminary estimates of possible alternatives to providing navigation at that site. The Corps' general approach was a series of low dams on the Tennessee River to provide navigation whereas, with our multiple purpose concept, we could provide for the three main purposes much better by a series of relatively high dams, but we investigated both high dam and low dam development.

CRAWFORD: What did you think of the previous planning done by the Corps? Did you find that in good order?

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MATTERN: Yes, it was very good for their purpose--as I said, their main purpose at that time. This, incidentally, is one of the contributions I think that TVA has made in that none of the old-line agencies had any interests in the multiple-purpose approach whereby the same reservoir storage space is used for a number of purposes. TVA had that, and we approached the development from that basis. And just the difference in concept meant that we had to look at things from the three major approach angles; that is, power, navigation, and flood control. But the Corps of Engineers' early studies were very helpful to us in getting going, particularly the maps which we called TRS sheets--those are Tennessee River Survey sheets--and that helped an awful lot in our early work. We used those exclusively until our own mapping organization got advanced far enough to provide maps.

CRAWFORD: Do you remember when that was that your own mapping organization started supplying the material you needed?

MATTERN: I don't remember exactly when we began to use them, but the mapping program was initiated immediately. Actually, in the fall of '33 it was initiated but I don't remember exactly when we began to use our first map.

Of course, the U. S. Geological Survey organization had large scale maps of the valley available at that time.



Although those maps were at a pretty big scale, they were still helpful. But for actual layout work we used these TRS sheets.

CRAWFORD: When did you first arrive in Knoxville?

MATTERN: January 16, 1934.

CRAWFORD: Was that your first experience in the Valley?

MATTERN: Yes, it was, and it was quite interesting. We got the office in Keyser, West Virginia where I had been working for this consulting engineer on some CWA work. We got the offer, I guess, maybe Thursday of a week and we were told to report on Monday morning. We had to finish up some work we were doing, and we left Keyser early in the morning of the fourteenth after a very heavy snowfall in which all of the roads were obliterated. We drove over the Appalachians--I still shudder to think of it--and all that we had to go by were some fence posts on either side of the road. Of course, this was our first really permanent job that we'd had in eighteen months, so we were going to be in Knoxville on the morning of the sixteenth, or else--and we were! We got into Knoxville on Sunday night and stayed at a downtown hotel and reported on Monday morning.

CRAWFORD: What were your first impressions of Knoxville and the valley area?



MATTERN: Our only contact with the Valley had been about five years before. My wife had been teaching at the University of Kentucky, and we were married in Lexington, Kentucky. We honeymooned partially in Tennessee, but we never got down to the Tennessee River, but we crossed the Cumberland River and got to Nashville and so on. Our first impressions of the area were that it was rather backward because every major river we came to we had to cross on a ferry. There were hardly any bridges. But we came to the valley without any formed impressions--just coming to a new area. We soon grew to like the country. In fact, we think East Tennessee is probably the most desirable place to live in the whole Country.

CRAWFORD: Have you lived in Knoxville all this time?

MATTERN: Yes. Of course, we've lived in different parts of Knoxville; but our headquarters have been at the main engineering office for TVA all this time.

CRAWFORD: In what condition did you find TVA when you arrived? What sort of working space did you have? How well was it organized?

MATTERN: TVA had offices all over the downtown area. Because of the Depression and I guess some over-building at the time, there was a fair amount of office space available. The town, as I was told, was pretty near bankrupt at the time





so there was plenty of space. Our first working space was in the New Sprinkle Building. That building had not been occupied, so as soon as TVA got some desks and things we moved in. The rooms were not designed for large groups, but I found this quite adequate for the type of work which we were doing.

CRAWFORD: Did you do all your work in the office, or did you have to travel to construction sites?

MATTERN: Well, it was some of both. One of the things, incidentally, that you might be interested in is that the heads of these organizations, for example, Mr. Riegel, who was head of design, and Mr. Bowman, who was head of the planning work--neither one of them had their families in Knoxville. Even though our office hours were set, we almost felt guilty if we got up and left before at least a half an hour overtime, and that continued for, oh, nine months or so. It was the most dedicated organization that one could hope to find. Many of the engineers had been out of work for some months and they were really interested in the work, and the whole TVA concept was so new and so challenging to them that everybody just . . . Well, it was so new that if one left work on time you sort of felt guilty.

CRAWFORD: What did you think of the ability--the professional quality--of the staff you found at TVA when you arrived?



MATTERN: I think TVA was very fortunate in being set up at the time that it was set up. Because of the Depression there were engineers of far higher quality than would have been available at any other time. For example, Mr. James Bowman had been one of the leading engineers of Harza Engineering Company; Mr. Riegel had been with the West Penn Power Company; Mr. Raymond Hopkins, who was the Chief Electrical Engineer, had had a very high post at Stone and Webster, and that whole thing just carried on through with the higher engineering group. And then because of the greatly varied experience and diverse experience that these engineers had, TVA was able to get the benefit of many different opinions and approaches which they otherwise could not have obtained. So TVA was very fortunate; something like this could never happen again, and, of course, the country was in a position to accept TVA. It would be impossible now to set up another organization like TVA in the United States. There are some reasons for that we won't go into, but the point is that conditions were right for formation of a resource development organization like TVA to be set up with engineering personnel which was available at that time.

CRAWFORD: You mentioned the varied background of the engineering personnel. Were there any patterns? Did significantly large numbers of them come from certain types of engineering experience or certain companies or from certain engineering schools or certain geographical areas within the nation?





MATTERN: Since the development involved hydro projects which would produce power and flood control and navigation, the engineers employed were selected from organizations where they had obtained such experience. And through no design, but because of the actual facts, most of these engineers came from the North. There were a few who had worked for the Corps of Engineers in various locations in the South, one being Clifton T. Barker, who had worked on the Corps of Engineers survey of the Tennessee River, and also Nicholas W. Bowden, who had worked on the original Corps of Engineers survey of the river--they were employed. But on the whole, the engineering organization came from the North from such consulting engineering firms as Harza Engineering Company, from the Miami Conservancy District, which had been put together by Arthur E. Morgan and who were the prime flood control people in the country, and Stone and Webster, the Safe Harbor Engineering Company, and groups of that type.

CRAWFORD: In your own work at Norris, how much did you rely on the plans that had been drawn up by the Bureau of Reclamation?

MATTERN: As assistant to Mr. Riegel, I did not work solely on Norris. At that time Norris and Wheeler were being designed by the Bureau of Reclamation. So our work at the beginning dealt directly with those two, plus the initial



planning of Pickwick Landing project, which was the one chosen for development on the main river. The main work which I did on Norris was to help coordinate the design between the Bureau of Reclamation, our own small force in the office here in Knoxville and the force at Norris Dam. We had three groups who were doing design and construction of Norris. The main design work, of course, was by the Bureau, but as with all construction jobs there are always changes which need to be made in the field. TVA had one man whose sole job was to go back and forth between Knoxville and Denver (where the Bureau of Reclamation is located) with the drawings and the changes and so on which had to be made. And my work was to coordinate the work of these three organizations so that this go-between had the complete story. In addition to that we had some small jobs in Norris Reservoir. For instance, I designed and supervised construction of the Big Ridge Dam which was built on one arm of Norris Lake to provide a constant level lake for recreation development, and also we had some dikes which had to be built in Norris Reservoir, and I did some layouts and design on some of those. And then the same coordination work had to be done in connection with the Wheeler project between the design and construction organizations, between TVA and the Bureau of Reclamation office in Denver.

Towards the end of that time I got into the turbine work, and we witnessed the acceptance tests of the Wheeler units. And later on they ran some so-called index tests of these same units in the field; I was on those. Then we ran field tests, a



so-called Gibson Test out of the Norris unit, and I was on that. And then by that time TVA was actually getting into the whole development of the Valley, and our job expanded as the development of the projects along the main river expanded.

CRAWFORD: Now, what year was it that you went to work with the Chief Mechanical Engineer? That was '36?

MATTERN: About '36.

CRAWFORD: How far had you gone with design work to that time?

MATTERN: The design work at Norris and Wheeler had been largely completed. By that time the organization had been set up so there was a Pickwick Landing design group with its Chief Design Engineer for that group and one for Guntersville and one for Hiwassee. They had been set up with their own organizations so my work slackened off, and the work with the turbines expanded so I was shifted over to the mechanical engineering.

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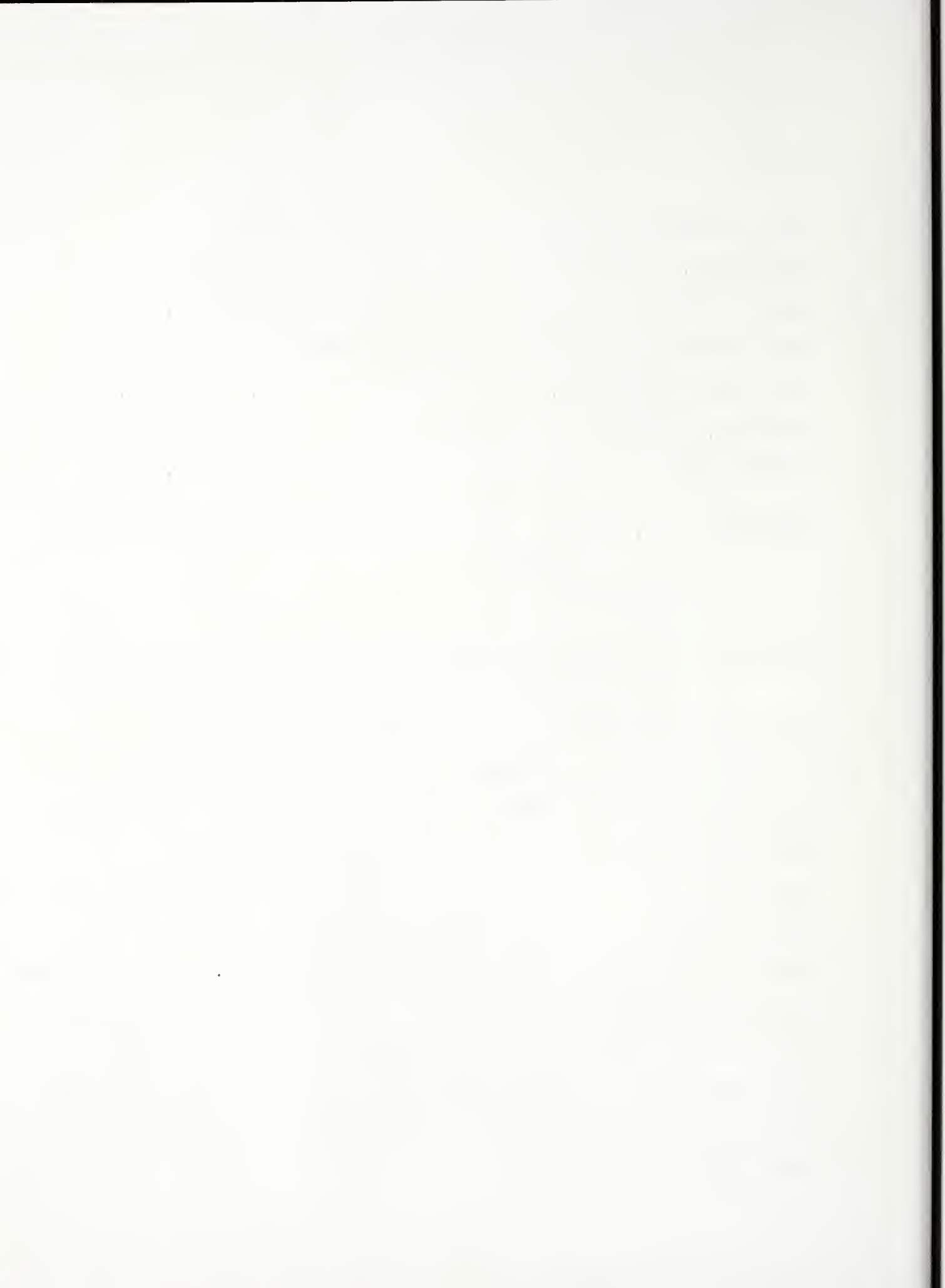




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CRAWFORD: Mr. Mattern, let's go ahead with the change in your work in 1936.

MATTERN: In 1936 I was transferred to work directly for the Chief Mechanical Engineer in connection with turbine testing. Because of the type of main river development which we were doing, the acceptance tests of units for proposed plants could best be made on models of these units. These models were sixteen-inch diameter runners whereas the prototypes or the ones actually installed in the field were, for example, 264 inches at Wheeler and 292 inches at Pickwick. Now we had two types of tests which had to be run on these units. These turbines were Kaplan or fixed blade units. Cavitation is a real important item on such turbines, so we ran both cavitation tests and efficiency tests. The manufacturer, of course, would guarantee performance under cavitating conditions and also the efficiency which could be obtained.



CRAWFORD: Would you say a bit more about cavitation tests for any non-engineering people who might hear this?

MATTERN: When water goes through a hydroelectric unit there is a vacuum formed, and if this vacuum breaks in its course through the turbine, it can be destructive to the lining of the draft tube, which is the name given to the lower end of the water passages, or to the actual turbine runner itself. The effect on the turbine is to cause pitting and pitting takes the form of small holes in the runner blades, and this can get so bad that the actual blade itself is destroyed. Both output (horsepower) and efficiency are affected. One of the results of the test is to determine where pitting might occur, and in those areas stainless steel is welded onto the runner. This, of course, resists the erosive action of the cavitation process. We've always had cavitation; we had it on almost all kinds of hydraulic turbines, but it is a particular problem with both Kaplan and the fixed blade type of unit. The art was greatly advanced by the work which was done in connection with these TVA units. As I think I indicated before, the tests which were run on the Wheeler units were the first acceptance tests which had ever been run on a unit which was actually going to be installed in a plant.

Now, in the course of my work I conducted or was a TVA representative at the laboratory where we tested the Pickwick unit. This was made by Allis-Chalmers Manufacturing Company of Milwaukee, Wisconsin. The Chickamauga units which were made by



Baldwin-Southwork Corporation in Philadelphia, and the Guntersville units which were made by S. Morgan Smith Company at York, Pennsylvania. These tests took anywhere from a month to six weeks, and during that time I lived in the different towns where they were being conducted, so I was away from Knoxville during that time.

CRAWFORD: Who was the Chief Mechanical Engineer then?

MATTERN: George Rich was the Chief Mechanical Engineer. The man who handled the actual mechanical work--the prime mover work--was J. Frank Roberts, who incidentally lives in Boca Raton, Florida now. I don't know whether you've talked with him or not. He would be a good one, incidentally, for you to see. He was not with TVA for very long.

CRAWFORD: How do you spell the name, sir?

MATTERN: R-o-b-e-r-t-s.

CRAWFORD: Frank?

MATTERN: J. Frank. His first initial is J.--J. Frank. He had been associated with Allis-Chalmers Manufacturing Company, and he left TVA to go back to Allis-Chalmers. And he soon became vice president of engineering for that company, until he retired a number of years ago.





CRAWFORD: What other work did you do with the Chief Mechanical Engineer?

MATTERN: As the shop drawings came in for the different units, we checked over them to see that they agreed with the specifications and the proposal drawing that had been submitted. But our time was largely taken up with this test work.

CRAWFORD: When you're ready, Mr. Mattern, let's get on to the change in your work with TVA that took place when you transferred to the Division of Water Power Planning, which I believe was your main work with the Authority.

MATTERN: This was Division of Water Control Planning. I was transferred to that division the first of November, 1938, and I was put in charge of preliminary investigations looking toward modernization of the Hales Bar project. The Hales Bar project had been acquired in 1939 from the Tennessee Electric Power Company as part of the Tennessee Electric Power Company acquisition. It had been built in 1905 and finished in 1913, and the TVA's problem was to determine what to do with it. The dam had been built without adequate foundation investigation and treatment, and it leaked quite badly. The units in the powerhouse were quite old, of course, at the time they had been acquired, and the spillway capacity was quite a bit less than TVA's standards so our job was to determine the best way



to plan for the future--and that was immediate future--the work to be done on it. So I headed up this small group whose job was to determine what should be done there. Our little force worked directly under Mr. James Bowman, who at that time was the head of the Project Planning Branch.

We worked with that for a number of years, and then as other projects came along we worked on the preliminary investigations of them. In 1954 I was made head of the Project Planning Branch. In the meantime Mr. Bowman had been made head of the division, and Mr. Reed Elliot, who had been head of the branch for a number of years, was promoted to be Assistant to Mr. Bowman. So at that time we did preliminary investigations for hydro plants and also steam plants of the Authority; and everything built from, oh, I guess 1938 on, we had a hand in one way or another.

CRAWFORD: What work did you do for these projects mainly?

MATTERN: The way TVA was set up was that a group in the Water Control Planning Division called the Project Planning Branch made all the preliminary investigations for a project. This meant development of a concept, the determination of the pool levels with hydro plants, the installed capacities, the type of dam to be built, the development of the preliminary cost estimates, and the determination of the economics.

I should have said that, in the first place, the Board of Directors of TVA are the ones who authorize projects.



In that respect they're different from the other construction agencies of the federal government who have to get their projects approved by the Congress. The TVA Board of Directors does the authorizing, but of course the appropriations are made by Congress. So our work was to develop a sound project in a very preliminary way; just going far enough to get cost estimates and so on, and to prepare what we called a project planning report. This report was submitted to the Board of Directors who, if they approved it, was sent on to the Congress as a basis for the first appropriation. If money was appropriated, then this general project report was turned over to the Division of Design, and they carried on detailed design and carried it on through the construction stage.

Even in the construction stage the Division of Water Control Planning had the land surveys and adjustments to make in the reservoir. One of the jobs we in Project Planning had was the location and appraisal of any water powers; that is, grist mills or any little private water power plants or any kind of industrial plants which would be affected by the reservoir. For instance, in Douglass Reservoir we had Bush canning people. We had to make an appraisal of their cannery which was then taken by the Land Branch as a basis of the money which they would offer the owner of the property. And, also, if there were any water supplies or sewage plants in the reservoir which would be affected, our Project Planning Branch would effect those adjustments too. That's the work which we did beyond the stage where I said that we did the preliminary





investigations.

In addition to these actual project investigations we made systems studies to identify possible future projects, and to determine the possible installed capacities which might be developed in the future. Then our branch also had the primary responsibility of setting up the allocation of the investment in the multiple purpose facility. The investment in these facilities had to be divided between power, navigation, and flood control, and the amount invested in power facilities has to be repaid to the federal government. It's quite important that an allocation be made between investment in these facilities.

CRAWFORD: How did you allocate? Did you have a formula that you used?

MATTERN: No, we allocated as a system. We did not allocate as one direct project. We couldn't do that. I mean, we couldn't do it as a unit because, well, just take for example a project like Fontana or Norris--or any of those plants on the tributaries. The release of water would have an effect on all plants downstream, and the flood control provided there would make more effective the projects downstream. So you had to allocate as a system, and with each group that was added we had to make a new allocation. But the allocations that were made as directed by the Congress were any projects that were completed as of June 30 of some year, and we didn't have to make allocations every year, of course, but just whenever



the projects are completed.

CRAWFORD: How far ahead of the project did you start this work--this planning?

MATTERN: That is rather difficult to put a handle on. Just for example, which I guess might be a poor example, but with the controversial Tellico project, which is now in the course of construction, we started investigational work on that by 1938. That was part of the general investigations made to decide the different projects which would provide navigation to Knoxville. One of the items set out in the TVA Act was to provide nine-foot navigation from the mouth of the river to Knoxville, so an early priority was to set up generally the order of the projects which would be built. So with Tellico, for instance, when it was decided that Fort Loudoun was the one to be built, it was logical that the Little Tennessee would be connected with Fort Loudoun at the same time, so we began work on that. That, however, is not a very good example.

In direct answer to your question, I would say the concentrated planning would begin about three or four years before the project was authorized by the Board of Directors. Once a project was authorized by the board, depending on action of Congress, it would be another two and a half years before it would be constructed.

CRAWFORD: I suppose you had some exceptions to that time span

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during the war, didn't you?

MATTERN: Very much so. The Douglas project is a very good example. It was built in eighteen months, and the detailed planning work on that was done probably in a year and a half before that. We had a continuing program for possible development, so many of these sites we had identified and had done some very preliminary work on--for instance, on Douglas their big controversy as to whether the Watauga project should be built before Douglas. So we had done work on both of those in a general way. But what I'm getting at is that there were very few projects from, say 1940 on, that we had not done some "eyeballing" work on before we actually started on the detailed planning.

CRAWFORD: You were attempting to plan ahead to deal with possible future developments, weren't you?

MATTERN: That's right. One of the things contained in the TVA Act was to develop fully the water resources of the Tennessee Valley so that when we had time we'd be looking generally at future possibilities. From the very beginning other organizations were developing the drainage areas and the stream flow records at different points on the streams of the valley, getting basic information available so that whenever we began the investigations we had this backlog of information which our maps and survey group and the hydraulic data group and



all of them had developed. Of course, we couldn't have done some of this if we hadn't had that basic information available to us.

CRAWFORD: How large a staff did you have?

MATTERN: In the Project Planning Branch our numbers varied from twenty to thirty-five. We sort of prided ourselves on having a stable organization. Some of the other organizations at TVA had ups and downs, but our work was such that if we weren't working on one phase, we could jump over to something else and then go back and forth. There were times whenever our whole force, in the case of Douglas, say, would be concentrated on one project to get it ready, and when that was done then they could go back to other jobs. We generally divided our work by river basins. One small group would work on possibilities of development of one river basin; another worked on one, and so on.

One of the longest jobs that we worked on was the development of the Upper French Broad River Basin in North Carolina. There were some floods in mid-August, 1940 which did a great deal of damage in that area, and a flood control plan was developed in about '42, I guess it was. Well, that came right during that war, and all the emphasis at that time was to spend money for something that would produce power, so that a non-power project like the French Broad was put on the back burner. Then, later on, with more interest in other phases





besides pure flood control, we started work on it again and looked at the whole French Broad River Basin's 1,664 square miles with the idea of developing a multiple purpose system for flood control, water supply, recreation and fish and wildlife. In fact, we were doing real comprehensive planning work for all these things now considered under environmental or ecological work long before that idea became so popular.

CRAWFORD: I'd like to ask you about that. Can you go into some detail about the work that was being done with these environmental considerations?

MATTERN: The upper French Broad area probably would serve as the best example. The major problem was flood control, but we had industrial plants in the valley which added pollution to the stream. Hence, another problem was storage of water for dilution of this pollution. That was one item, and this pollution, although it can be largely pinpointed--the plants were very important in the whole picture of the valley. They employed many people so that it was not a local problem; it was a whole regional problem. So it was felt that storage of water for dilution of this pollution was a logical purpose.

In the early days (1910-30) people came to the French Broad Basin during the summertime because of its desirable climate, and they came largely to Brevard and Hendersonville and Asheville. They were content to stay at these towns without

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any special recreation facilities--just being in the high country was enough for them. But over the years the desirability of having water around for recreation had become increasingly important, so in cooperation with the state organizations and with the organization of the counties of western North Carolina and the Upper French Broad Development Commission, TVA felt that recreation was a desirable purpose to incorporate in these projects.

Another item was water supply. The towns of Hendersonville and Asheville get their water from mountain reservoirs, but with the development and with the requirements of industry and population, they will both need more than they have now, so storage for water supply entered into the picture.

Because of the possible construction of impoundments on some of the tributaries, the trout fishing which there was on some of these streams would be affected. Our fish and wildlife people went into this question very thoroughly and all of us worked closely with the state of North Carolina--with their Fish and Game Commission--and through a lot of give and take and so on we pointed out to them that the cold water which would be stored in these reservoirs would transfer the downstream fishing from warm water fishery to a cold water fishery. So we felt, and had them convinced, that we were actually increasing the lake fishing, and at the same time we weren't decreasing the amount of clear water fishing which would be available.

There's an interesting angle that TVA has brought into this matter, that water released from the lower part of a

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reservoir is usually deficient in oxygen, and TVA went through a series of tests on what we call a Howell-Bunger valve. It's a very simple valve which our Project Planning Branch thought would add oxygen to the water. Our hydraulic laboratory ran extensive tests and confirmed our opinion. The water comes out of the valve (the valve is a cone-shaped affair) and the water comes out of it in a circular form and is propelled into the air. As it does so, it catches oxygen as the water goes up and comes down. This is an efficient and cheap way to get the oxygen back in the water, and thus solved the objection which some of the fish people had to releases from reservoirs.

Another item which is a side effect of the creation of these reservoirs would be the possibility of shore line development, not only for these recreational areas which would be built along them, but also for residential use too. The impoundments in the Upper French Broad Valley would be very desirable as homesites.

So, sort of summing this up, TVA had and was working on a multiple-purpose development and considering the environmental factors for some time long before the interest became so strong nationally in this subject.

CRAWFORD: Who was responsible for that sort of thinking in TVA? It seems rather advanced for its time.

MATTERN: I don't think you can point to any one person. I think it could probably be credited to we in the





Division of Water Control Planning, with some urgings to look into different angles by possibly the general manager, or one of the directors, or likely by some of the fish and wildlife people. It was very much a cooperative affair, and we in Project Planning might claim credit for a whole lot of it, but we had very, very close contacts with everybody. And the cooperation between the different organizations was very, very great, so that I think one could say it's a TVA effort.

CRAWFORD: Was there ever any opposition to including this kind of consideration?

MATTERN: To answer that question one would have to go back to the rules which were set up by the federal government for appraisal of water control projects. Back in the Eisenhower days, I believe it was, the so-called Green Book was set up as a basis for economic appraisal of water control projects and which was followed by a so-called Circular A-47. That set out the items which could be appraised in economic determinations, and those did not put values on some of these items that we took into account in the French Broad so that when you talk about opposition I think one might say that there was objection to putting a value on some of these items. You could consider them and talk about them as intangibles, but the push towards consideration of them as tangible items which could be included in project analysis was done largely by TVA. We felt that they had definite value, and so promoted consideration.



CRAWFORD: Did you have full support within TVA for including environmental consideration in your planning?

MATTERN: Oh, I think so. There was objection, of course, from some people. It was pointed out, of course, by certain folks that we couldn't do this and that because of Circular A-47 and so on, but we persisted. Actually, I believe TVA was one of the very first to try to put a value on recreation. We did that on--well, the early Tellico studies. Looking back now with all the complicated methods which are used to arrive at figures, we said that a visitor a day, for instance, was worth about fifty cents to a dollar in appraisal of a project. And we had no surveys and so on to base that on--just some horse sense--and we felt that we were very conservative, and we proposed those and such things. The idea of including visitor-days in recreation value was gradually agreed to.

CRAWFORD: Really that was difficult to estimate, wasn't it?

MATTERN: Oh, very difficult, very difficult. And of course that's one of the reasons over the years that some of these weren't pushed more--in an appraisal of a project. For instance, what's a visitor day of fishing worth? I mean, how much should you evaluate that at? And would trout fishing be more than some other kind of fishing? There were many problems, but we in Project Planning felt for many years that even though some benefits were difficult to evaluate, they were



nevertheless real benefits provided by a water project and should be given some value even though we were the first to admit that it was an art and not a science.

CRAWFORD: You were convinced though that each visit had a certain value for the Authority?

MATTERN: It wouldn't necessarily apply to the Authority, but it would accrue to the project or to the region. It was a benefit no matter to whom would get it. The people, for instance, that live around the area, the man who had the minnow tank or the tackle equipment and so on, he would get the benefit from the project which he wouldn't get otherwise; and that's a benefit.

CRAWFORD: You could estimate, I suppose, that each visiting fisherman would spend something in the course of this time that he was there.

MATTERN: That's right. That's right. And he would spend more than he would spend otherwise that day. And it's quite complicated, and it deserved a lot of investigation which started maybe around, oh, I don't know, 1964 or '5--something like that--and has become very intensive since. I personally feel that some of this has been given too much weight in that something which is an art more or less and has been given scientific--well, figures of sorts have made it into a science

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almost. So some of the items I don't personally believe can ever be any more than based on real good judgment.

CRAWFORD: Did anyone think it unusual that TVA was concerned with these things so early?

MATTERN: I wouldn't have any real basis to answer that, although I do know that TVA was thinking about recreation development before, say, the Corps had done much on it. TVA had a number of men go from here to, say the Corps of Engineers in Nashville who had the Cumberland River Basin, and some of the things we were doing here at TVA had not been started there before these men went over there. I know that. Through discussions at conventions and gatherings of this type I think the whole water resource development group of people were beginning to talk about it. I wouldn't say that TVA had to push these folks, but I do feel that TVA led the way in much of it.

CRAWFORD: How did the preservation of forests in the area fit with this program? Were the ideas coordinated in any way?

MATTERN: In development of the water resource projects our Project Planning Branch did not do the planning in a vacuum. As you know, TVA probably has a wider variety of experts than any water development construction organization



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the federal government has. For instance, we have our Division of Agriculture with our experts in that; our forestry people-- we have a very skilled group in that; and the fish and wildlife people, for instance, are recognized as experts in the fishery field, so whenever we started to investigate a project we were in touch with all the organizations within TVA who might have any interest in the project. We got their ideas, and they were incorporated insofar as possible in the project. Now, we could not, of course, maximize, oh say, flood control. We could not maximize the fish and wildlife; we couldn't maximize any one of the different benefits. One of our main jobs in our project planning and one of the real good points about the way TVA planned a project through this Project Planning Branch is that we had no axe to grind at all. We collected and coordinated throughout our planning work the ideas of these organizations within TVA, all of whom were experts in their own field, so that when you ask about whether forestry was considered, it as well as all the others were considered in the planning of the project. And of course compromises had to be made, and we had to be the ones that came up with the final proposal.

CRAWFORD: What about the training of your staff? Were all members of your staff engineers? Did you have other people?

MATTERN: Yes, during most of these years they were all civil engineers. We tried and did get some employees who



had a particular interest in economics, say. We got them in, and then we had people who were skilled more in one phase of the work than in another, but fundamentally they were all civil engineers. But, as you know, civil engineering is probably the broadest and most general field of engineering and we found that adequate. Whatever we lacked in knowledge, there's somebody in TVA who could supply it, and we were very free to utilize the help of these other people.

CRAWFORD: Did you try in hiring personnel to get engineers with any certain background? Were they always civil engineers?

MATTERN: Well, they were always civil engineers, but if we had some work that we had planned for them to do we would try to get somebody with a background that we needed. We tried to get well-rounded individuals. Of course, as you look back over these years we're talking about, much of that time manpower was at a premium. And it was just not a case of getting just the ones that you wanted; it was a case of getting somebody. And of course if you also remember during these war years and some of the other years, the pay which government people were getting was less than they could get in private practice. It's only in more recent years that the federal government pay has come up so that it's really in line with private practice.



CRAWFORD: After you became head did you do the hiring of the personnel?

MATTERN: Yes. Well, yes and no. TVA's method--all the direct employment is done by the Division of Personnel, and whenever we needed somebody we asked personnel to send us application files of people who would qualify, who've had experience and training along the line in which we were interested. They would send us a file--a set of applications--and we would go through that and pick out those that we wanted to learn more about, and we would then ask Personnel to have the individual in for an interview. We would do the interviewing, and if we decided on somebody, we would request that an offer be made. Each of the divisions has a personnel man, so once we decided on somebody we would tell our Division of Water Control Planning personnel man that we wanted an offer made to so and so. He would go through the personnel organization, and the offer was made. So we never made a direct offer, but no time that I remember was our recommendation turned down.

One of the things that we feel particularly good about is the cooperation and the work which we did within TVA and with the fish, recreation and game groups of some of the valley states--particularly Alabama, North Carolina, and Tennessee. We didn't always agree with them or they with us, but we were both willing to compromise some and came out with what we considered good projects. A good example is the work which we did with the people from North Carolina. The area to

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be protected from flooding in the Upper French Valley was such that we had to have a combination of reservoirs plus channel work. Now, the scheme of channel work which has been used for years and years by the Corps of Engineers, say, and SCS and which has caused considerable difficulty, was to go in and dig a large ditch, to take out all the trees, take out all vegetation and so on--in other words, make a very efficient hydraulic channel. We, working with our own TVA fish people, came to the conclusion that if we excavated one side only of the channel, leaving the trees and brush on the other side and always insuring a channel in the middle, say, or on one side where the water would have some depth at all times--not just "an inch deep and a mile wide" but with enough depth so fish could move up and down stream where there would be pools here and there for them--that we would not hurt the fishing too much and at the same time would increase the flood carrying capacity of streams. We'll take credit for that idea. Of course, we had some difficulty in pushing it through our own TVA forces because obviously it would require a greater cost than just going in and digging a channel, would require more care during construction, and would not be quite as efficient a flood carrying capacity. But it was finally agreed to, and that is the way the plans were set up for the Upper French Broad.

Now down in Bear Creek in northern Alabama we were promoting something the same way, but as talk developed because of the great meandering of this Bear Creek the channel there--and it's being built now; probably constructed by this time--



it's to have a series of cut-offs along the side which would come into the different bends of the creek. We would leave the creek as is except with selected tree trimming and so on. It would carry the normal flow of the stream, but any flood waters would go through these by-pass channels. So the point we're getting to is that by working cooperatively with different interested organizations we were able to solve this one problem.

CRAWFORD: Have you had good relations with state organizations throughout?

MATTERN: We've had very good relations with the working people of the different organizations; as I said, we didn't always agree. And the fish people would prefer to leave things the way they are, but they were very cooperative to help in the whole scheme of things.

CRAWFORD: How had the work of the Division of Water Control Planning changed by the time you retired? I'm sure you saw some development of it from the time you went there.

MATTERN: Yes, when the division was set up we were following the law very closely; that is, in respect to the directives that were in there, and all the thrust in the early years was to provide nine-foot navigation from the mouth to Knoxville. As that work has been completed the emphasis had



gone to other things. There was a great development in, say, mapping. The mapping work of TVA, incidentally, is under the Division of Water Control and Planning, and the mapping work has undergone great change. It started out with mostly planimetric work using plane tables and things like that, and now it's all aerial photography, and they've gotten into sensing work--temperature work and so on and greatly advanced work. There also have been great changes in the hydraulic side of things--change from a basic data collecting basis to a very sophisticated type of radio networks--and, of course, in all of this the computer has changed the work of the organizations.

The work in my own Project Planning Branch has been greatly changed in the last several years with the major water resource developments largely completed and with the thrust on the environmental aspects, the protection of ecology, and so on--possible impoundments are in bad favor--and with the National Water Resources Council's setting up guidelines which make it more difficult to justify economically water control projects. That phase of the work has been greatly curtailed.

To take its place has been the vast amount of work which is involved in answering the questions raised by the projects already under construction and some that have been planned. The work involves preparation of impact statements to fulfill the requirements of the Environmental Protection Agency Act. This, of course, requires review upon review by other agencies in the federal government and is involving a great amount of time and expense. This work had already started





before I retired but has been greatly accentuated since that time. Then we have gotten into helping counties and regions with water and sewage projects. Sometime before I retired we were helping on development of an overall water supply grid system for the nine-county area in East Tennessee. This was in connection with the East Tennessee Development District work. TVA, through us, was supplying the technical assistance in developing a potential water supply system for a whole region--not just one town but, as I said, for nine counties in East Tennessee--and since that time the organization has worked on water supplies for other areas. This is still going on and will as the regional concept becomes more and more important and the regional planning idea becomes more readily accepted. As part of this Tellico project we did work on this Timberlake planned town. I don't know whether you've heard about that or not.

CRAWFORD: Would you tell a little more about that, Mr. Mattern?

MATTERN: Well, as part of the Tellico project there will be 5,000 acres of land made available for industrial use. It's entirely logical that in connection with this that the opportunity for a model town presented itself, and that it would utilize the shores of Tellico Lake. Our Project Planning Branch developed the water supply system and the sewage system which would be used in connection with a town. This, of course,





would include water treatment plants and sewage disposal plants, collection systems, and so on. Our work in connection with that was a general appraisal--the same as all our other work was--and development of preliminary cost estimates.

CRAWFORD: How did TVA come to get into this planning of the town of Timberlake?

MATTERN: I can't be too positive of that because the idea for it originated with our regional planning organization. They, of course, had been in touch with the model towns (Reston, Columbia) that had been developed up East particularly, and some of our folks saw the possibility and the reasonability of a town in connection with the industrial development. The towns in the area of industrial sites are not large enough nor would have the facilities to take care of the population which would come in, so I think a combination of the opportunity for TVA to demonstrate again, plus the need for housing, say, or living facilities in this area, sort of went together but the idea did not originate in our organization. It came to us to develop the engineering side of it.

CRAWFORD: Was this to be a completely new town?

MATTERN: Yes, it's a completely new town on the shores of Tellico.



CRAWFORD: Well, is this in any way comparable to the planned town of Norris?

MATTERN: Well, I guess you could say that it would be.

Norris, of course, was in the very early days. The one at Timberlake would eventually be a planned town for population of, say 35,000 to 50,000 people, and everything would be larger in scale, but now that you mention it, I think it just really is a growth of the Norris idea because Norris certainly was a demonstration town in its concept with the schools and all the other things that Norris has. I guess that's right. I hadn't thought of that.

CRAWFORD: Is this the first TVA planned town since Norris?

MATTERN: Yes, although TVA built towns to serve the different construction jobs. Pickwick had a small town or a construction camp; Wheeler had one; Hiwassee had a town. Since that time the jobs have been near enough to communities so that TVA did not have to build construction camps.

CRAWFORD: Are there any other aspects of this work that you'd like to mention at this time, Mr. Mattern?

MATTERN: I don't believe so. I think we've covered things in rambling sort of way. I hope that we've hit some of the things that are of interest to you.

CRAWFORD: Yes, sir, indeed. Thank you very much.

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